CLAIMS

1.   A data processing method for determining record data allocation on an information recording medium having
5   a plurality of recording layers, the method characterized by having:

an allowable jump range determining step of determining an allowable range of an intra-layer jump and an inter-layer jump performed in a playback processing of
10 said information recording medium;

a required jump time calculating step of calculating a required time for the intra-layer jump and the inter-layer jump on the basis of allowable jump range information determined in said allowable jump range
15 determining step; and

a consecutive data allocation size determining step of determining an allowable minimum consecutive data size of data to be stored in the information recording medium on the basis of the required jump time calculated in said
20 required jump time calculating step.

2.   The data processing method as claimed in Claim 1, characterized in that:

said required jump time calculation step is a step
25 of calculating:

as to an intra-layer jump, a sum of a seek time of a pickup and an overhead time involved in a processing for a read data unit block of the information recording medium, and
30 as to an inter-layer jump, a sum of the seek time of the pickup, a pickup adjustment time involved in

an inter-layer seek, and an overhead time involved in a processing for a read data unit block of said information recording medium.

5   3.   The data processing method as claimed in Claim 1, characterized in that:
said consecutive data allocation size determining step is a step including an allowable minimum playback time determining step of determining an allowable minimum
10   playback time as a playback time corresponding to the allowable minimum consecutive data size of the data to be stored in the information recording medium, and determining the allowable minimum consecutive data size of the data to be stored in the information recording
15   medium on the basis of said allowable minimum playback time.

3.   The data processing method as claimed in Claim 3, characterized in that:
20   said allowable minimum playback time determining step is a step of calculating the allowable minimum playback time [t] on the basis of a jump time [TJUMP], a data read out rate [Rud] from a disc in a drive and a data recording rate [RTS] in accordance with the
25   following equation:
t = TJUMP × Rud/(Rud-RTS); and
said consecutive data allocation size determining step is a step of determining the allowable minimum consecutive data size of the data to be stored in the
30   information recording medium on the basis of the allowable minimum playback time [t] calculated by said

equation in accordance with the following equation:

$$Usize = t \times RTS.$$

5.   The data processing method as claimed in Claim 1,
5   characterized by further having:

a data setting processing step of identifying jump
origin data and jump destination data that can be
generated in the playback processing of the stored data
in the information recording medium and setting a
10   distance between the jump origin data and the jump
destination data within the allowable jump range
determined in said allowable jump range determining step
on the basis of the identification information.

15   6.   The data processing method as claimed in Claim 5,
characterized in that:

said data setting processing step carries out a
processing of setting the distance between the jump
origin data and the jump destination data within said
20   allowable jump range by an interleave processing of clip
data set as a data unit of storage target data on the
information recording medium.

7.   The data processing method as claimed in Claim 1,
25   characterized by further having:

a data recording step of performing data recording
on the information recording medium in a data unit larger
than or equal to the consecutive data allocation size
determined in said consecutive data allocation size
30   determining step.

8.   A data processing apparatus for determining record data allocation on an information recording medium having a plurality of recording layers, said apparatus characterized by having:

5   allowable jump range determining means that determines an allowable range of an intra-layer jump and an inter-layer jump performed in a playback processing of said information recording medium;

    required jump time calculating means that

10 calculates a required time for the intra-layer jump and the inter-layer jump on the basis of allowable jump range information determined by said allowable jump range determining means; and

    consecutive data allocation size determining means

15 that determines an allowable minimum consecutive data size of data to be stored in the information recording medium on the basis of the required jump time calculated by said required jump time calculating means.

20 9.   The data processing apparatus as claimed in Claim 8, characterized in that:

    said required jump time calculating means calculates:

    as to an intra-layer jump, a sum of a seek

25 time of a pickup and an overhead time involved in a processing for a read out data unit block of the information recording medium, and

    as to an inter-layer jump, a sum of the seek time of the pickup, a pickup adjustment time involved in

30 an inter-layer seek, and an overhead time involved in a processing for a read out data unit block of said

information recording medium.

10.   The data processing apparatus as claimed in Claim 8,
characterized in that:

5   said data processing apparatus further includes
allowable minimum playback time determining means that
determines an allowable minimum playback time as a
playback time corresponding to the allowable minimum
consecutive data size of the data to be stored in the
10   information recording medium, and
          said consecutive data allocation size determining
means is configured to determine the allowable minimum
consecutive data size of the data to be stored in the
information recording medium on the basis of said
15   allowable minimum playback time.

11.   The data processing apparatus as claimed in Claim
10, characterized in that:
          said allowable minimum playback time determining
20   means is configured to calculate the allowable minimum
playback time [t] on the basis of a jump time [TJUMP], a
data read out rate [Rud] from a disc in a drive and a
data recording rate [RTS] in accordance with the
following equation:
25   t = TJUMP × Rud/(Rud-RTS); and
          said consecutive data allocation size determining
means is configured to determine the allowable minimum
consecutive data size of the data to be stored in the
information recording medium on the basis of the
30   allowable minimum playback time [t] calculated by said
equation in accordance with the following equation:

Usize = t × RTS.

12.   The data processing apparatus as claimed in Claim 8, characterized in that:

5   said data processing apparatus further has data setting processing means that identifies jump origin data and jump destination data that can be generated in the playback processing of the stored data in the information recording medium and sets a distance between the jump

10   origin data and the jump destination data within the allowable jump range determined in the said allowable jump range determining means on the basis of the identification information.

15   13.   The data processing apparatus as claimed in Claim 12, characterized in that:

        said data setting processing means is configured to carry out a processing of setting the distance between the jump origin data and the jump destination data within

20   said allowable jump range by an interleave processing of clip data set as a data unit of storage target data on the information recording medium.

14.   The data processing apparatus as claimed in Claim 8,

25   characterized in that:

        said data processing apparatus further has data recording means that performs data recording on the information recording medium in a data unit larger than or equal to the consecutive data allocation size

30   determined in said consecutive data allocation size determining step.

15. An information recording medium having a plurality of recording layers, characterized by having:

a configuration storing therein data larger than or equal to an allowable minimum consecutive data size determined on the basis of a required jump time of an intra-layer jump and an inter-layer jump executed in a playback processing of the information recording medium.

16. The information recording medium as claimed in Claim 15, characterized in that:

said required jump time is:

as to an intra-layer jump, a sum of a seek time of a pickup and an overhead time involved in a processing for a read out data unit block of the information recording medium, and

as to an inter-layer jump, a sum of the seek time of the pickup, a pickup adjustment time involved in an inter-layer seek, and an overhead time involved in a processing for a read out data unit block of said information recording medium.

17. The information recording medium as claimed in Claim 15, characterized in that:

said allowable minimum consecutive data is a size determined on the basis of an allowable minimum playback time as a playback time corresponding the allowable minimum consecutive data size of the data to be stored in the information recording medium.

18. The information recording medium as claimed in

Claim 15, characterized in that:

said information recording medium further has data allocation of setting a distance between jump origin data and jump destination data in a jump processing that can

5 be generated in a playback processing of the stored data of the information recording medium within an allowable jump range.

19.   The information recording medium as claimed in

10 Claim 18, characterized in that:

said information recording medium further has data allocation in which the distance between the jump origin data and the jump destination data is set within said allowable jump range by an interleave processing of clip

15 data set as a data unit of storage target data on the information recording medium.

20.   A computer program for executing a data processing for determining record data allocation on an information

20 recording medium having a plurality of recording layers, said computer program characterized by having:

an allowable jump range determining step of determining an allowable range of an intra-layer jump and an inter-layer jump performed in a playback processing of

25 said information recording medium;

a required jump time calculating step of calculating a required time for the intra-layer jump and the inter-layer jump on the basis of allowable jump range information determined in said allowable jump range

30 determining step; and

a consecutive data allocation size determining step

of determining an allowable minimum consecutive data size
of data to be stored in the information recording medium
on the basis of the required jump time calculated in said
required jump time calculating step.

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21.   A data processing method for determining record
data allocation on an information recording medium, said
method characterized by having:

a data size determining step of determining a data

10   size as a minimum size of data to be stored in the
information recording medium on the basis of allowable
jump range information determined as an allowable range
of a jump processing in a playback processing of said
information recording medium; and

15   a data allocation determining step of determining a
data recording configuration in which a data block having
said data size is so allocated as to be playable in the
jump processing within said allowable jump range.

20   22.   The data processing method as claimed in Claim 21,
characterized in that:

said data size determining step is a step of
determining a data size as a minimum size of data to be
stored in the information recording medium on the basis

25   of the allowable jump range information of an intra-layer
jump and an inter-layer jump.

23.   The data processing method as claimed in Claim 21,
characterized in that:

30   said data size determining step is a step of
determining a data size on the basis of a table in which

a data recording rate [RTS] is made corresponding to the allowable minimum data size of the data to be stored in the information recording medium.

5 24.   The data processing method as claimed in Claim 21, characterized in that:

said data size determining step is a step of determining a data size on the basis of a relational expression between a data recording rate [RTS] and the

10 allowable minimum data size of the data to be stored in the information recording medium.

25.   The data processing method as claimed in Claim 24, characterized in that:

15   said relational expression is an expression shown by the following equation:

$$S_{EXTENT}[byte] \geq \frac{T_{JUMP}[ms] \times R_{UD}[bps]}{1000 \times 8} \times \frac{TS\_recording\_rate[bps] \times 192}{R_{UD}[bps] \times 188 - TS\_recording\_rate[bps] \times 192},$$

setting that an allowable minimum data size of the data to be stored in the information recording medium is S_{EXTENT},

20 a total jump time is T_{JUMP}, a data read out rate from a disc in a drive is R_{ud}, and a data recording rate [RTS] is $TS_{recording\ rate}$.

26.   A data processing apparatus for determining record

25 data allocation on an information recording medium, said apparatus characterized by having:

a data size determining apparatus that determines a data size as a minimum size of data to be stored in the information recording medium on the basis of allowable

30 jump range information determined as an allowable range

of a jump processing in a playback processing of said information recording medium; and

a data allocation determining apparatus that determines a data recording structure in which a data block having said data size is so allocated as to be playable in the jump processing within said allowable jump range.

27. The data processing apparatus as claimed in Claim 26, characterized in that:

said data size determining means is configured to determine a data size as a minimum size of data to be stored in the information recording medium on the basis of the allowable jump range information of an intra-layer jump and an inter-layer jump.

28. The data processing apparatus as claimed in Claim 26, characterized in that:

said data size determining apparatus is configured to determine a data size on the basis of a table in which a data recording rate [RTS] is made corresponding to the allowable minimum data size of the data to be stored in the information recording medium.

29. The data processing apparatus as claimed in Claim 26, characterized in that:

said data size determining apparatus is configured to determine a data size on the basis of a relational expression between a data recording rate [RTS] and the allowable minimum data size of the data to be stored in the information recording medium.

30. The data processing apparatus as claimed in Claim 29, characterized in that:

said relational expression is an expression shown by the following equation:

$$S_{EXTENT}[byte] \geq \frac{T_{JUMP}[ms] \times R_{UD}[bps]}{1000 \times 8} \times \frac{TS\_recording\_rate[bps] \times 192}{R_{UD}[bps] \times 188 - TS\_recording\_rate[bps] \times 192},$$

setting that an allowable minimum data size of the data to be stored in the information recording medium is S_{EXTENT}, a total jump time is T_{JUMP}, a data read out rate from a disc in a drive is R_{ud}, and a data recording rate [RTS] is $TS_{recording\ rate}$.

31. A computer program for executing a record data allocation determining processing on an information recording medium, said computer program characterized by having:

a data size determining step of determining a data size as a minimum size of data to be stored in the information recording medium on the basis of allowable jump range information determined as an allowable range of a jump processing in a playback processing of said information recording medium; and

a data allocation determining step of determining a data recording structure in which a data block having said data size is so allocated as to be playable in the jump processing within said allowable jump range.